

WHAT IS CLAIMED IS:

1. A method for tracking a carrier frequency offset and a sampling frequency offset between a transmitter for concurrently transmitting subcarriers that have orthogonality and a receiver for receiving them, comprising:

5 (a) detecting data received from the transmitter by using a first signal, and tracking a phase offset caused by the carrier frequency offset by using the detected received data;

10 (b) detecting the data received from the transmitter by using the first signal, and tracking the phase offset caused by the sampling frequency offset by using the detected received data;

15 (c) compensating for the phase offset caused by the carrier frequency offset between the transmitter and the receiver according to the phase offset tracked in (a); and

15 (d) compensating for the phase offset caused by the sampling frequency offset between the transmitter and the receiver according to the phase offset tracked in (b).

2. The method of claim 1, wherein (a) and (b) comprise tracking the phase offset in consideration of a gain value of each subchannel on which a pilot signal is located.

20 3. The method of claim 2, wherein (a) and (b) comprise comparing a Euclidean distance between the first signal and theoretical signals, and detecting the received data by using the theoretical value that corresponds to the nearest distance.

4. The method of claim 3, wherein (b) comprises calculating a

gradient value of a straight line that corresponds to the phase offset on the time axis by using a linear regression method.

5. The method of claim 4, wherein an estimate of the gradient value of the straight line satisfies the subsequent equation:

$$\hat{\alpha}_i = \frac{\sum_{j \in \{pilot_index\}} (w_j + w_{-j}) \cdot j \cdot \phi_{i,j} + \sum_{j \in \{data_index\}} (w_j + w_{-j}) \cdot j \cdot \phi'_{i,j}}{\sum_{j \in \{pilot_index\}} (w_j + w_{-j}) \cdot j^2 + \sum_{j \in \{data_index\}} (w_j + w_{-j}) \cdot j^2}$$

where i is an OFDM symbol index, j is a subchannel index, and w_j is a weight.

6. The method of claim 1, wherein (c) comprises:

removing unnecessary noise of a frequency band by enabling the tracked phase offset to pass through a loop filter; and
10 enabling the signal that has passed through the loop filter to pass through a digital voltage control oscillator, and applying the signal for compensation of the phase offset of the signal received at the next symbol interval.

15 7. The method of claim 1, wherein the first signal has passed through a frequency domain equalizer.

8. A device for tracking a carrier frequency offset and a sampling frequency offset in an OFDM (orthogonal frequency division multiplexing) wireless communication system, including a transmitter that concurrently transmits orthogonal subcarriers and a receiver that receives them, comprising:
20 an analog/digital converter for converting a signal received by the receiver into a digital signal;

a guard interval remover for removing a guard interval from the converted digital signal;

an FFT (fast Fourier transform) unit for transforming the guard-interval-removed signal into a signal in a frequency domain;

5 an FEQ (frequency domain equalizer) for recovering a signal distorted by a communication channel from the converted signal in the frequency domain; and

10 an offset tracker/compensator for tracking a phase offset caused by the carrier frequency offset and the sampling frequency offset and compensating for the same by using the signal received from the FEQ.

9. The device of claim 8, wherein the offset tracker/compensator detects data received from the transmitter by using the signal received from the FEQ, and tracks the phase offset caused by the carrier frequency offset and the sampling frequency offset by using the detected received data.

15 10. The device of claim 9, wherein the offset tracker/compensator tracks the phase offset in consideration of a gain value of each subchannel on which a pilot signal is provided.

11. A recording medium for a method for tracking a carrier frequency offset and a sampling frequency offset between a transmitter that concurrently 20 transmits orthogonal subcarriers and a receiver that receives them, comprising:

(a) detecting data received from the transmitter using a first signal, and tracking a phase offset caused by the carrier frequency offset using the detected received data;

(b) detecting the data received from the transmitter using the first

signal, and tracking the phase offset caused by the sampling frequency offset using the detected received data;

(c) compensating for the phase offset caused by the carrier frequency offset between the transmitter and the receiver according to the phase offset tracked in (a); and

(d) compensating for the phase offset caused by the sampling frequency offset between the transmitter and the receiver according to the phase offset tracked in (b).

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